1 6 JUN 2008

Chris Kump-Mitchell, P.E.
Missouri Department of Natural Resources (MDNR)
Hazardous Waste Program
1738 East Elm Street (lower level)
Jefferson City, Missouri 65102

Dear Ms. Kump-Mitchell:

RE: Modine Manufacturing Facility
RCRA Facility Investigation Report (RFI), dated April, 2008.
RCRA ID #MOD062439351

The Environmental Protection Agency (EPA) has reviewed the human health risk assessment portion of the above Modine RFI report and is providing the following comments.

**General Comment**

1. Modine's approach to evaluating the vapor intrusion pathway is inconsistent. Although the indoor air pathway has been addressed previously through the collection of indoor air samples, the risk assessment re-evaluates the vapor intrusion into indoor air pathway using the Johnson & Ettinger (J&E) model for soils. There is no rationale provided that explains why the results from the 2003 indoor air sampling used to make an Environmental Indicator determination were not assessed quantitatively in the risk assessment. Troubling this issue, is that while the risk assessment mentions the significant uncertainties with using the J&E model for soil contamination, it fails to mention that the concentrations of contaminants detected in indoor air are significantly greater than (10-1000 times) the concentrations predicted by modeling. No other information has been provided to suggest that the 2003 results are not representative of current conditions. Furthermore, Modine has applied occupational exposure limits (i.e., OSHA PELs) to assess measured data, and then used EPA risk assessment approaches to evaluate health risks for modeled data despite the fact that the exposure scenario has not changed. Had the 2003 data been used in the risk assessment, health risks would exceed acceptable levels (i.e., $>10^{-4}$ cancer risk).

   Assuming that conditions at the site have not changed in a manner that would affect the vapor intrusion pathway and/or there were no background sources of contaminants at the time of sampling, the J&E Model significantly underestimates exposure concentrations. Therefore, unless information is available to suggest otherwise, the use of the modeling over real measurement data is not supported and the risk assessment should use the 2003 indoor air data. Also, regardless of their applicability, occupational exposure limits (e.g., PELs) cannot be used to characterize health risks in USEPA human health risk assessments. The applicability and use of those values is a risk management decision.

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**Specific Comments**

1. **Section 6.2.2.1 (p. 6-2).** Although it does not impact the risk assessment (i.e., all chemicals with low detection frequencies were below screening levels), please note that *Risk Assessment Guidance for Superfund: Human Health Evaluation Manual (RAGS) (Part A)* provides a 5% detection frequency as an example, not a guideline for screening chemicals of potential concern (COPCs) from quantitative risk assessment. Several other criteria outlined in Section 5.9.3 of RAGS Part A must be met when eliminating COPCs based on frequency of detection.

2. **Section 6.2.2.2 (p. 6-3).** The risk assessment evaluates soils between 0 and 3 feet below ground surface (bgs) as surface soils. Per USEPA guidance, surface soils under an outdoor industrial worker scenario are typically defined as soils between 0 and 2 feet bgs (USEPA, 1996 & 2002).

3. **Section 6.3.1 (p. 6-4).** The trespasser scenario is considered incomplete given that site access is limited by a 6-foot tall fence and that the fence will remain intact in the future. Although the health risks for the trespasser scenario would be accounted for under other exposure scenarios, we do not believe this pathway is incomplete due to a fence. As discussed in the text, the fence limits access, but it does not entirely prevent access. Also, the presence and condition of this fence in the future can only be speculated. The risk assessment should state that this exposure pathway is complete and address the pathway qualitatively (i.e., risks are accounted for under the industrial worker scenario).

4. **Section 6.3.3 (p. 6-4).** The text in this section does not state whether the future industrial worker is an outdoor or indoor worker. However, with the exception of the soil ingestion rate and exposure frequency, the risk assessment evaluates an outdoor worker by accounting for the dermal contact and inhalation of volatiles outdoors exposure pathways, which are typically not evaluated in the indoor worker scenario. The soil ingestion rate of 50 mg/day and exposure frequency of 250 days/year are default values for the indoor worker (USEPA, 2002). Modine should revise the risk assessment so that it uses a soil ingestion rate of 100 mg/day and exposure frequency of 225 days/year to address the reasonable maximum exposure (RME) for the outdoor worker. Modine should also add language to the text that states that the risk assessment evaluates the future outdoor industrial worker scenario. Additional language can be added to the text that states that the outdoor worker health risks will account for the indoor worker scenario (i.e., soil ingestion), with the exception of, the vapor intrusion into indoor air pathway.

5. **Section 6.3.4 (p. 6-5).** The last sentence uses exposure concentration, exposure frequency, and exposure duration as examples of upper-bound values that EPA uses to quantify exposure. As discussed in Section 6.3.5.1, EPA recommends using an upper confidence limit (UCL) of the arithmetic mean for exposure concentrations, not an upper-bound value, such as the ones used for exposure frequency and duration. Please remove exposure frequency from the example and replace it with another exposure parameter that is based on an upper-bound value, not a statistical average.

6. **Section 6.3.5.2 (p. 6-5).** This section states that trichloroethylene (TCE) in ambient air was modeled using soil exposure point concentrations in the 0-to-3-foot and 0-10-foot intervals. Per EPA guidance, the inhalation of volatiles outdoors should account for the entire column of contaminated soil (USEPA, 1996 & 2002). Therefore, the inhalation exposure pathways (industrial worker) should account for the entire depth of contamination, not specific intervals. The risk assessment should be revised accordingly.

   This section also states that a particulate emission factor (PEF) was used to evaluate TCE in ambient air and that the site-specific dispersion factor (Q/C) was obtained from MDNR's MRBCA technical guidance. First, a PEF need not be estimated for volatile compounds, such as TCE. Fugitive dust emissions are of general concern for the top 2 centimeters of soil where volatile contaminants are likely to be depleted (USEPA, 1996). For this reason, the risk assessment should not evaluate exposure to TCE and other volatile compounds via fugitive dust emissions. Furthermore, the risk assessment should derive site-specific Q/C values consistent with EPA guidance or use default Q/C values of 68.18 and 14.31 $g/m^2$-s per $kg/m^3$ for the industrial/commercial and construction worker scenarios, respectively (USEPA, 2002). As a reminder, the default $Q/C_{sa}$ value for the construction worker scenario cannot be modified for climatic zone (only source size), unless the site-specific value is derived by running EPA's SCREEN3 dispersion model (USEPA, 2002). The dispersion correction factor ($F_D$) used in estimating the volatilization factor is applicable to the default climatic data used to estimate the default $Q/C_{sa}$.

7. **Section 6.3.5.3 (p. 6-6).** The site-specific Johnson & Ettinger modeling uses a depth to top of contamination of 7 feet. Per Appendix A-3, a depth of 7 feet represents the average depth to residual contamination within the building footprint. Regardless of our other comments on this pathway, we do not agree with Modine's approach and use of this parameter. First, contamination has been detected at less than 2 feet below the building's foundation, which is expected given the type of release (i.e., surface) that occurred at SWMUs 26 and 31. Second, the data sets used to estimate the average soil depth do not appear to be comparable. Based on the data and discussion provided in the RFI, the same depth intervals were not consistently sampled at each sampling location. Shallow soil samples were collected at some locations, while deep samples were collected at others. In fact, the first depth interval sampled at some locations (as indicated in Table 4-1) were at depths greater than 8 feet bgs. If samples were not collected from shallower soil intervals, then the deeper intervals cannot be used to estimate an average depth to contamination. In addition, the depth intervals used to estimate the average depth range from a couple feet to several feet. The risk assessment does not specify the exact depth that was used from each interval to estimate the average. The data provided does not justify the use of 7 feet depth interval in the J&E Model. As discussed in General Comment 1, irrespective of the model inputs, the use of the modeling over real measurement data is not supported and the risk assessment should use the 2003 indoor air data. EPA also recommends that Modine evaluate whether there is sufficient mass of VOCs in the subsurface below the building to generate the long-term levels in indoor air that modeling predicts.

8. **Section 6.4 (p. 6-7).** We recommend listing the entire toxicity value hierarchy provided in OSWER Directive 9285.7-53 rather than listing only those sources that were specifically used in the risk assessment.

9. **Section 6.6.1 (p. 6-9).** A majority of the discussion tends to focus on the sources of the TCE slope factors rather than the uncertainties associated with the TCE toxicity values. However, a discussion on the TCE toxicity values used to characterize health risks is not provided in the toxicity assessment. Modine should revise the risk assessment so that the toxicity assessment discusses the sources of TCE toxicity values.

   Also, the second paragraph states, "Mechanisms of TCE-induced adverse health effects and carcinogenesis are very complex, and a great deal of uncertainty is considered to exist with these draft values; these values are considered highly conservative among the risk assessment community." This passage should be removed from the assessment since much of it contains statements of opinion rather than fact. It also does not specifically discuss the uncertainties with TCE toxicity values. If uncertainties with the 2001 draft assessment are discussed, then this section should provide a balanced discussion on the strengths and limitations of the assessment. Uncertainties with the CalEPA values should also be discussed. The draft assessment and toxicity values are based on more current science than CalEPA's TCE toxicity values. Information on the strengths and limitations of the 2001 draft assessment can be obtained from peer review comments provided by EPA's Science Advisory Board and the National Academy of Science.

10. **Section 6.6.2 (p 6-10).** This section mentions the uncertainties with using the J&E model for soils, but fails to mention that the concentrations detected in indoor air in 2003 are 10-1000 times greater than the levels predicted by modeling. Although real measurements should be used to characterize health risks in the risk assessment, the uncertainties regarding the predictive power of the J&E model should be discussed within the context of the results of the indoor air samples collected in 2003.

    In addition, the air concentrations were less than one percent of the lowest occupational exposure limit, this section states that concentrations in indoor air are below the calculated comparative screening levels for industrial workers. That statement is untrue and should be removed from the risk assessment. The risk assessment should include a revised statement stipulating that concentrations of contaminants detected in the 2003 air samples do exceed risk-based screening levels (see table below), including levels based on a $10^{-4}$ cancer risk level.

| | Maximum Detection ($\mu g/m^3$) | Risk-based screening Level ($10^{-6}$ cancer risk) | Risk-based screening Level (HI = 1) |
|---|---|---|---|
| TCE | 330 | 1 (1) | 40 (2) |

(1) Based on CalEPA's inhalation unit risk value(CalEPA, 2008).
(2) Based on the draft RfC in the draft 2001 trichloroethylene toxicity assessment (USEPA, 2001).

11. **Tables 3.1 – 3.3.** Unless a footnote is provided that explains the difference in the data sets used to estimate the average and the UCL of the mean, we recommend providing the arithmetic mean of all sample results including non-detect results using the ½ detection limit method. Several of the 95% UCLs of the mean, which account for non-detects results, are less than the average concentration of detect-only samples.

12. **Table 6.1.** This table provides CalEPA's weight of evidence/cancer guideline description of "2A" for TCE, but does not define the classification. This table also states that an EPA weight of evidence/cancer guideline description is not available. The 2001 draft assessment does provide a cancer guideline description that is consistent with EPA's 2005 Cancer Guidelines. Please add the following language to this table and Table 6.2:

    "According to the 2001 draft TCE Assessment, TCE is highly likely to produce cancer in humans."

    Per the Integrated Risk Information System's profile for 1,1,1-trichloroethane (1,1,1-TCE), please provide the following cancer guideline description:

    "inadequate information to assess carcinogenic potential."

13. **Appendix A-3.** Except for the input and intercalculation worksheets for 1, 1, 1-trichloroethane (1, 1, 1-TCA), the appendix does not contain the output worksheet for 1, 1, 1-TCA or the input and output worksheets for TCE and vinyl chloride. This information must be provided in the final risk assessment.

If you have any questions you may reach me at (913) 551-7159 or at Garrett.David@epa.gov.

Sincerely,

David Garrett
Environmental Scientist
RCRA Corrective Action & Permits Branch
Air and Waste Management Division

AWMD/RCAP:cas:h:/DGARRETT/MODINEMANUFACTURING-HUMANHEALTHRISK
ASSESSMENTCOMMENTS(APRIL2008).DOC/061408

**References**

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U.S. EPA. 2003. Human Health Toxicity Values in Superfund Risk Assessments. Office of Solid Waste and Emergency Response, Washington D.C. OSWER Directive 9285.7-53.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 7
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KANSAS CITY, KANSAS 66101

16 JUN 2008

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If you have any questions you may reach me at (913) 551-7159 or at Garrett.David@epa.gov.

Sincerely,

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## References

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